

**ABSTRACT**  
(1 page only)

**TITLE OF THE PAPER:**

**OPPORTUNITIES FOR EARTH OBSERVATION AND MONITORING ON  
SPACE STATION FREEDOM**

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**1 DESCRIPTION:** (should clearly present the purpose of your paper and include detailed information on the methods and results of your research)

Due to the fact that it will not fly in a highly inclined orbit, Space Station Freedom has frequently been overlooked as a platform on which to mount Earth observation payloads. However, although its 28° orbit will preclude any coverage of the poles or any high latitude regions, the Space Station will make frequent passes over the tropics. The existence of such a stable platform, with a design life of 30 years, provides unparalleled opportunities to monitor those portions of the Earth's surface which lie between the tropics of Cancer and Capricorn. The attached payload locations on the Space Station truss, together with those on the Japanese Experiment Module Exposed Facility, offer a unique opportunity to mount experiments which can be serviced, adjusted and replaced relatively frequently. Observation and monitoring of the Earth's tropical regions promise to yield significant data in three important areas; atmospheric dynamics and composition, atmospheric electrodynamics and disease control.

The tropical atmosphere receives the major part of the Sun's energy input to the earth. Study of the reflected radiation at low latitudes will increase our understanding of the terrestrial energy balance, and consequently of global warming mechanisms and rates. Limb observations of the atmosphere will yield data on composition at high altitudes. This will allow trace constituent (for example aerosol) concentrations to be measured regularly. The electrical characteristics of the atmosphere can be determined by systematic observation of lightning patterns. Electrical activity is linked with some of the major mechanisms which drive the Earth's weather system. In all these areas, measurements taken on the Space Station should not be treated in isolation, but instead should be correlated with those made by instruments mounted on other platforms, principally in polar Orbit.

Many of the major diseases which still afflict humanity are endemic in the tropical regions. In some cases (e.g. malaria), outbreaks are coupled to changes in local vegetation or other features which can be imaged from orbit. Long term and systematic observation offers the hope that early warning (and perhaps even preventative) techniques can be developed.

In addition to the opportunities to make observations, the Space Station also offers an accessible platform on which to test new instruments. The relative ease with which attached payloads can be accessed (compared to free flyer platforms) will allow a rapid prototype philosophy to be adopted towards instrument development, with a proposed design being flown, evaluated and adjusted or modified as necessary.